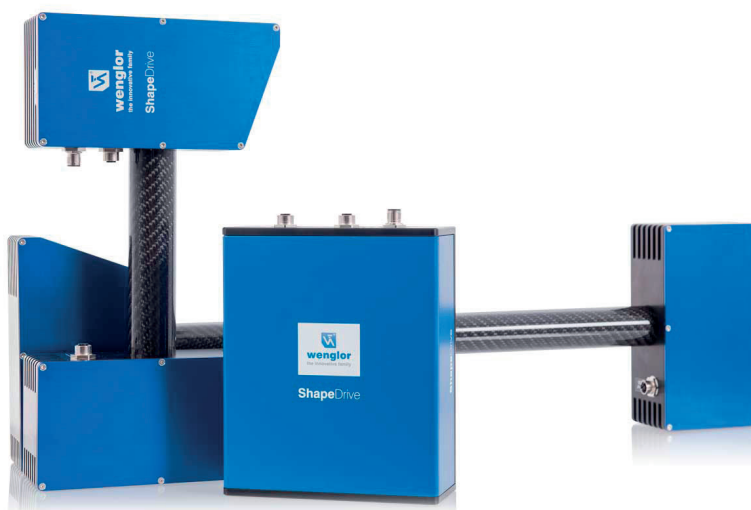


ShapeDrive

3D Sensors



Operating Instructions

Original operating instructions
Subject to change without notice
Available as PDF file only
Revision level: 28/09/2020
Version: 1.3.1
www.wenglor.com

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1. General

1.1 Information Concerning these Instructions

- These instructions are valid for the ShapeDrive series and permit safe and efficient use of the product.
- These instructions are an integral part of the product and must be kept on hand for the entire duration of its service life.
- Local accident prevention regulations and national work safety regulations must be observed before, during and after initial startup.
- The product is subject to further technical development, and thus the information contained in

these operating instructions may also be subject to change. The current version can be found at www.wenglor.com in the product's separate download area.



NOTE!

The operating instructions must be read carefully before using the product and must be kept on hand for later reference.

1.2 Explanations of Symbols

- Safety precautions and warnings are emphasized by means of symbols and attention-getting words.
- Safe use of the product is only possible if these safety precautions and warnings are adhered to.

The safety precautions and warnings are laid out in accordance with the following principle:



ATTENTION-GETTING WORD

Type and Source of Danger!

Possible consequences in the event that the hazard is disregarded.

- Measures for averting the hazard.

The meanings of the attention-getting words, as well as the scope of the associated hazards, are listed below:



DANGER!

This word indicates a hazard with a high degree of risk which, if not avoided, results in death or severe injury.



WARNING!

This word indicates a hazard with a medium degree of risk which, if not avoided, may result in death or severe injury.



CAUTION!

This word indicates a hazard with a low degree of risk which, if not avoided, may result in minor or moderate injury.



ATTENTION!

This word draws attention to a potentially hazardous situation which, if not avoided, may result in property damage.

**NOTE!**

A note draws attention to useful tips and suggestions, as well as information regarding efficient, error-free use.

1.3 Limitation of Liability

- The product has been developed in consideration of the current state-of-the-art, as well as applicable standards and guidelines. Subject to change without notice.
- A valid declaration of conformity can be accessed at www.wenglor.com in the product's separate download area.
- wenglor sensorische elektronische Geräte GmbH (hereinafter referred to as "wenglor") excludes all liability in the event of:
 - Non-compliance with the instructions
 - Use of the product for purposes other than those intended
 - Use by untrained personnel
 - Use of unapproved spare parts
 - Unapproved modification of products
- These operating instructions do not include any guarantees from wenglor with regard to the described procedures or specific product characteristics.
- wenglor assumes no liability for printing errors or other inaccuracies contained in these operating instructions, unless wenglor was verifiably aware of such errors at the point in time at which the operating instructions were prepared.

1.4 Copyrights

- The contents of these instructions are protected by copyright law.
- All rights are reserved by wenglor.
- Commercial reproduction or any other commercial use of the provided content and information, in particular graphics and images, is not permitted without previous written consent from wenglor.

2. For Your Safety

2.1 Use for Intended Purpose

The product is based on the following functional principle:

ShapeDrive 3D sensors project several stripe patterns onto the stationary objects to be measured. The 3D point cloud is generated from this series of images at the connected PC.

2.1.1 Range of Applications

This product can be used in the following industry sectors:

- Special machinery manufacturing
- Heavy machinery manufacturing
- Logistics
- Automotive industry
- Food industry
- Packaging industry
- Plastics industry
- Woodworking industry
- Consumer goods industry
- Paper industry
- Electronics industry
- Steel industry
- Construction industry
- Other industries

2.2 Use for Other than the Intended Purpose

- The product is not a safety component in accordance with the EC Machinery Directive.
- The product is not suitable for use in potentially explosive atmospheres.



DANGER!

Risk of personal injury or property damage in case of use for other than the intended purpose!

Use for other than the intended purpose may lead to hazardous situations.

- Instructions regarding use for intended purpose must be observed.
-

2.3 Personnel Qualifications

- Suitable technical training is a prerequisite.
- In-house electronics training is required.
- Trained personnel must have uninterrupted access to the operating instructions.



CAUTION!

Risk of personal injury or property damage in case of incorrect initial start-up and maintenance!

Personal injury and damage to equipment may occur.

- Adequate training and qualification of personnel.
-

2.4 Modification of Products



CAUTION!

Risk of personal injury or property damage if the product is modified!

Personal injury and damage to equipment may occur. Non-observance may result in loss of the CE mark and the guarantee may be rendered null and void.

- Modification of the product is impermissible.

2.5 General Safety Precautions



NOTE!

- These instructions are an integral part of the product and must be kept on hand for the entire duration of its service life.
- In the event of possible changes, the respectively current version of the operating instructions can be accessed at www.wenglor.com in the product's separate download area.
- Read the operating instructions carefully before using the product.
- The sensor must be protected against contamination and mechanical influences.

2.6 LED Warnings



LED risk group 2

DIN EN 62471:2009-03

Applicable standards and safety regulations must be observed.



NOTE!

Due to the normal human reactions of turning away from bright sources of light and withdrawing from thermal discomfort, lamps/luminaires do not represent any danger.

2.7 Approvals



3. Technical Data

Technical Data	Order Number	MLASxxx		MLBSxxx
Optical Data				
Light source	LED (blue)			
Wavelength	460 nm			
Service life (ambient temp. = +25° C)*	20,000 hours			
Risk group (EN 62471)	2			
Max. permissible ambient light	5000 lux			
Electrical Data				
Supply voltage	18 ... 30 V DC			
Max. current consumption (Uo = 24 V)	3.5 A		5 A	
Temperature range	0 ... +35° C			
Storage temperature	−5 ... +70° C			
Short-circuit protection	Yes			
Reverse polarity protected	Yes			
Interface	Ethernet TCP/IP			
Transmission speed	100 Mbit/s			
Transmission speed (10 GbE)	10 Gbit/s			
Protection class	III			
Integrated web server	Yes			
Mechanical Data				
Housing material	Aluminum/plastic			
Degree of protection	IP65 **		IP67 **	
Connection	M12×1, 12-pin			
Ethernet connection	M12×1, 8-pin, X coded			
Optic cover	Plastic			

* Service life is related to the LED. Since the LED is not permanently switched on, the service life increases accordingly

** Only when the cable is connected

Order Number	MLAS101	MLAS102	MLAS103	MLAS104	MLAS105
Technical Data					
Optical Data					
Working range Z	160 ... 170 mm	300 ... 340 mm	220 ... 320 mm	390 ... 590 mm	420 ... 720 mm
Measuring range Z	10 mm	40 mm	100 mm	200 mm	300 mm
Measuring range X	30 mm	60 mm	120 mm	240 mm	360 mm
Measuring range Y	25 mm	48 mm	90 mm	200 mm	300 mm
Resolution Z	4 μ m	6 μ m	10 μ m	12 μ m	20 μ m
Resolution X/Y	18 μ m	35 μ m	65 μ m	142 μ m	228 μ m
Camera resolution	2448 × 2048 pixels				
Electrical Data					
Recording duration	0.35...2.15 s				

Order Number	MLAS201	MLAS202	MLAS203	MLAS204	MLAS205
Technical Data					
Optical Data					
Working range Z	160 ... 170 mm	255 ... 295 mm	220 ... 320 mm	270 ... 470 mm	420 ... 720 mm
Measuring range Z	10 mm	40 mm	100 mm	200 mm	300 mm
Measuring range X	30 mm	60 mm	120 mm	240 mm	360 mm
Measuring range Y	22 mm	40 mm	80 mm	160 mm	240 mm
Resolution Z	3 μ m	5 μ m	9 μ m	10 μ m	20 μ m
Resolution X/Y	9 μ m	16 μ m	33 μ m	63 μ m	96 μ m
Camera resolution	4096 × 3000 pixels				
Electrical Data					
Recording duration	0.44...2.15 s				

Order Number	MLBS101	MLBS102	MLBS103
Technical Data			
Optical Data			
Working range Z	800 ... 1200 mm	1550 ... 2050 mm	1550 ... 2350 mm
Measuring range Z	400 mm	500 mm	800 mm
Measuring range X	500 mm	750 mm	1300 mm
Measuring range Y	380 mm	560 mm	1000 mm
Resolution Z	40 μ m	50 μ m	80 μ m
Resolution X/Y	281 μ m	406 μ m	783 μ m
Camera resolution	2448 × 2048 pixels		
Electrical Data			
Recording duration	0.35...2.15 s		

Order Number	MLBS201	MLBS202	MLBS203
Technical Data			
Optical Data			
Working range Z	590 ... 890 mm	1550 ... 2050 mm	1550 ... 2350
Measuring range Z	300 mm	500 mm	800 mm
Measuring range X	500 mm	750 mm	1300 mm
Measuring range Y	360 mm	540 mm	860 mm
Resolution Z	40 μm	50 μm	70 μm
Resolution X/Y	131 μm	224 μm	339 μm
Camera resolution	4096 \times 3000 pixels		
Electrical Data			
Recording duration	0.44...2.15 s		

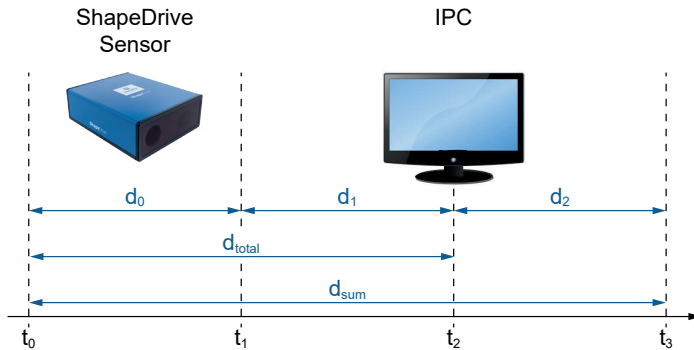
3.1 Thermal Protection Circuit

Depending on the mode of operation (duty-cycle), and in the case of operation without a cooling unit, the sensor may overheat. As of an internal housing temperature of greater than 85° C occurs, a protective circuit deactivates the sensor. The operating state LED is lit up continuously in red, as is the status indicator on the website (see section 6.1.1). After internal temperature has dropped to 75° C, the sensor is switched back to the normal operating state (the operating state LED blinks green).

3.2 Measurement Time Sequence and Duration

The 3D point cloud is not generated at the ShapeDrive 3D sensor, but rather at the connected industrial PC (IPC) via the ShapeDrive SDK or the GigE Vision server.

By way of illustration, the time sequence up through creation of a 3D point cloud and analysis is depicted in the following graphic.



t_0	Start measurement (sensor)
t_1	End image sequence recording (sensor)
t_2	End 3D point cloud calculation (IPC)
t_3	End point cloud analysis by means of user software (IPC)

d_0	Recording duration (sensor)
d_1	Process duration for 3D point cloud calculation (IPC)
d_2	Process duration for point cloud analysis by means of user software (IPC)
d_{total}	Total recording duration and point cloud calculation
d_{sum}	Total time ($d_{total} + d_2$)

3.3 System Requirements

Fulfillment of the following system requirements is recommended:

- Processor: Core i7 (at least 6th generation)
- RAM: 16 GB
- SSD hard disk: 250 GB
- One DeLOCK 89654 TM9710P 10GBase-T/NBase Ethernet card
- 1 x 1Gb Ethernet interface
- FLIR Spinnaker SDK software, 1.15.0.63 (x64)
- Windows 7/10 (64-bit)

The following network cards can be used as an alternative:

- Asus® XG-C100C 10G PCI-E Network adapter
- Intel® Ethernet Converged Network Adapter X540-T2
- Intel® Ethernet-Converged-Network-Adapter X550-T1
- StarTech.com ST10GSPEXNB

These requirements are e.g. fulfilled by the following IPC :

Nexcom NISE-3800E2/i7/16GB/250GB Fanless EmbeddedServer

- CPU: Intel Core-i7-6700TE 2.4 GHz
- Chipset: Intel Q170
- RAM: 16GB DDR4 2133MHz
- NIC: Delock PCI Eypress Card > 1 x 10 Gigabit LAN NBASE-T RJ45
- Operating System: Windows 10-Pro

Installation instructions for the DeLOCK 89654 TM9710P 10GBase-T/NBase Ethernet card:

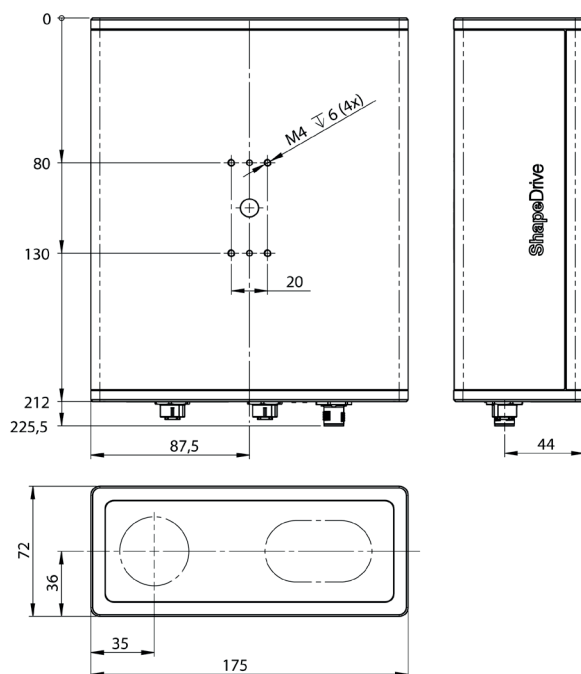
- Use PCIe-3.0
- Use the fastest PCIe slot
- Do not use PCIe slots with split lanes
- Do not connect any other plug-in cards to the PCIe
- Test other slots in case of problems (must comply with the manufacturer's specifications)
- Use the latest driver from the manufacturer
- Deactivate filter drivers from all other manufacturers
- Deactivate virtual interfaces

Configuration notes for the Windows operating system:

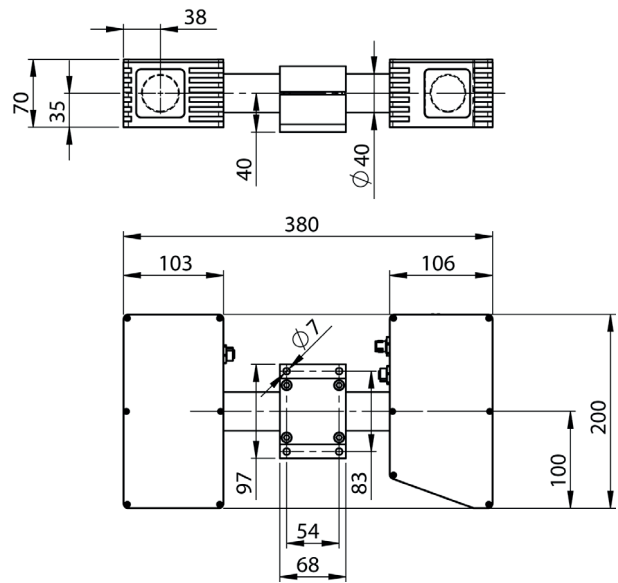
- Deactivate all antivirus programs
- Deactivate all firewalls
- Deactivate auto update
- Close all applications which are not required
- Close all background processes which are not absolutely necessary
- Avoid process-intensive applications parallel to the application for the ShapeDrive control
- Use the latest driver from the manufacturer for chipset
- Disconnect external devices such as USB stick or hard disks
- Always set energy management to maximum performance
- Prevent access to the PC via remote or other services
- Deactivate screen lock or automatic logout
- Avoid applications with high graphic demands

3.4 Housing Dimensions

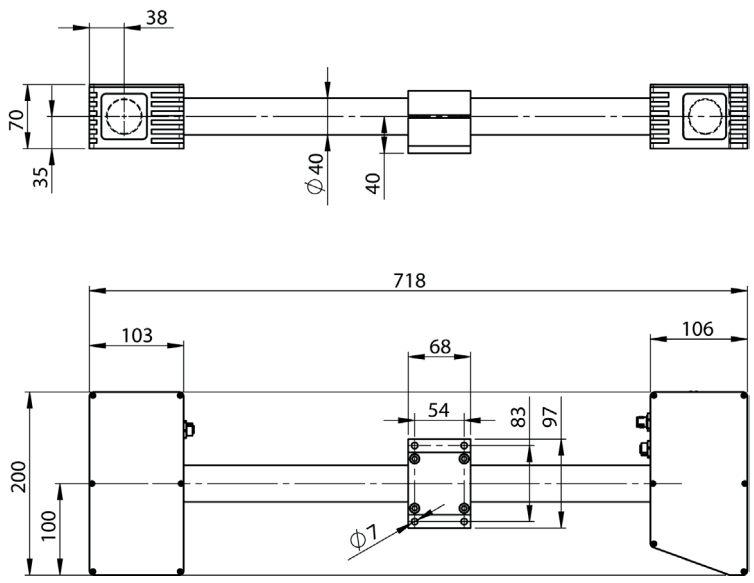
ShapeDrive MLASxxx



ShapeDrive MLBSx01



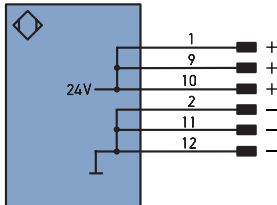
ShapeDrive MLBSx02
ShapeDrive MLBSx03



3.5 Connection Diagrams

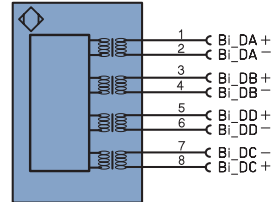
Connection Diagram, Voltage Supply:

238



Connection Diagram, Ethernet:


1022



ATTENTION!

All voltage supply pins must be connected!

Explanation of Symbols

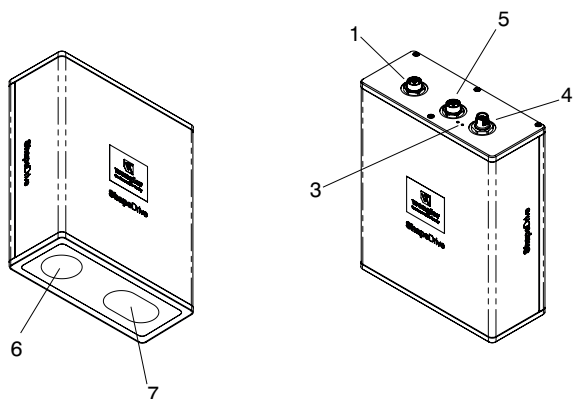
+	Supply Voltage +
-	Supply Voltage 0 V
~	Supply Voltage (AC Voltage)
A	Switching Output (NO)
\bar{A}	Switching Output (NC)
V	Contamination/Error Output (NO)
\bar{V}	Contamination/Error Output (NC)
E	Input (analog or digital)
T	Teach Input
Z	Time Delay (activation)
S	Shielding
RxD	Interface Receive Path
TxD	Interface Send Path
RDY	Ready
GND	Ground
CL	Clock
E/A	Output/Input programmable
	IO-Link
PoE	Power over Ethernet
IN	Safety Input
OSSD	Safety Output
Signal	Signal Output
BI_DA+/-	Ethernet Gigabit bidirect. data line (A-D)
EN0RS422	Encoder 0-pulse 0-0 (TTL)

PT	Platinum measuring resistor
nc	not connected
U	Test Input
\bar{U}	Test Input inverted
W	Trigger Input
W-	Ground for the Trigger Input
O	Analog Output
O-	Ground for the Analog Output
BZ	Block Discharge
AMV	Valve Output
a	Valve Control Output +
b	Valve Control Output 0 V
SY	Synchronization
SY-	Ground for the Synchronization
E+	Receiver-Line
S+	Emitter-Line
\oplus	Grounding
SnR	Switching Distance Reduction
Rx+/-	Ethernet Receive Path
Tx+/-	Ethernet Send Path
Bus	Interfaces-Bus A(+)/B(-)
La	Emitted Light disengageable
Mag	Magnet activation
RES	Input confirmation
EDM	Contacting Monitoring

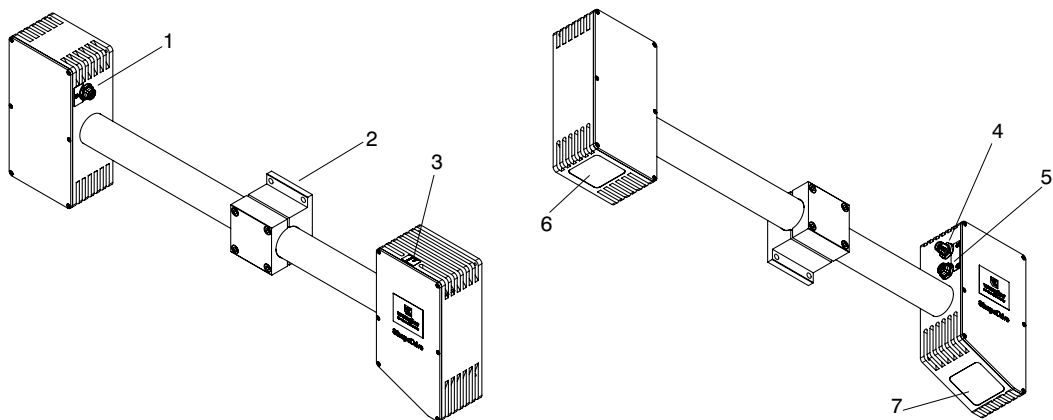
EN0RS422	Encoder A/A (TTL)
EN0RS422	Encoder B/B (TTL)
ENA	Encoder A
ENB	Encoder B
AMIN	Digital output MIN
AMAX	Digital output MAX
AOK	Digital output OK
SY In	Synchronization In
SY OUT	Synchronization OUT
OLT	Brightness output
M	Maintenance
rsv	reserved
Wire Colors according to IEC 60757	
BK	Black
BN	Brown
RD	Red
OG	Orange
YE	Yellow
GN	Green
BU	Blue
VT	Violet
GY	Grey
WH	White
PK	Pink
GYNE	Green/Yellow

3.6 Layout

ShapeDrive MLASxxx



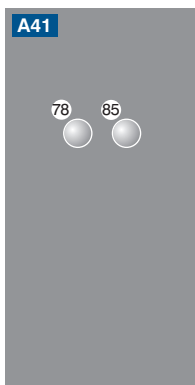
ShapeDrive MLBSxxx



- ① = Ethernet 10-Gb connector plug
- ② = Mounting clamp
- ③ = LED display
- ④ = Voltage supply connector plug
- ⑤ = Ethernet connector plug
- ⑥ = Receiver
- ⑦ = Light emission

3.7 LED Display

LEDs



78 = module status
85 = link/act

Designation	Status	Function
MS (module status)	Blinking green	Normal operating state
	Red	Error
Link/act	Red	Ethernet link OK
	Green	Ethernet link not OK

4. Transport and Storage

4.1 Transport

Upon receipt of shipment, the goods must be inspected for damage in transit. The manufacturer must be informed without delay concerning damage to the package. When returning the package, clear indication of transport damage must be attached.

4.2 Scope of Delivery

- ShapeDrive 3D sensor
- Quick start instructions
- Mounting set

4.3 Storage

The following points must be taken into consideration with regard to storage:

- Do not store the product outdoors.
- Store the product in a dry, dust-free place.
- Protect the product against mechanical impacts.
- Protect the product against exposure to direct sunlight.
- Observe storage temperature.



ATTENTION!

Risk of property damage in case of improper storage!

The product may be damaged.

- Comply with storage instructions.
-

5. Installation and Initial Start-Up

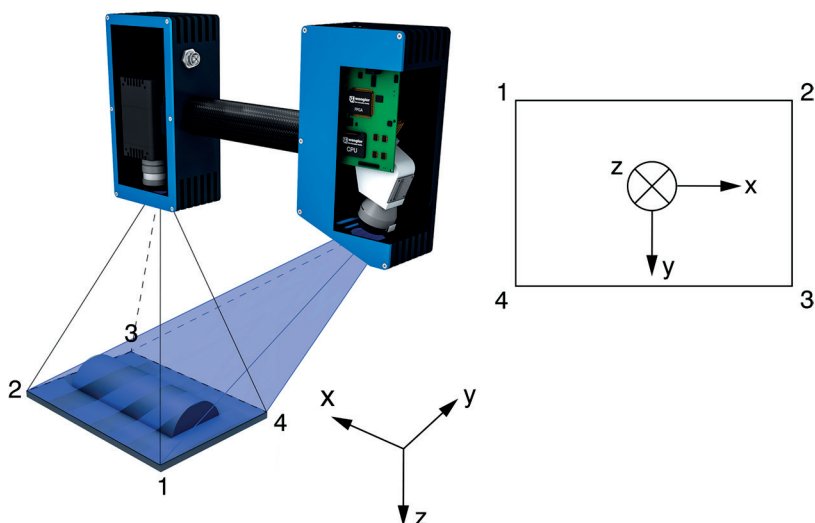
5.1 General Installation Instructions

- Electrical and mechanical regulations, standards, and safety rules must be complied with.
- Make sure that the sensor is mounted firmly and securely.
- The sensor must be protected against mechanical influences.
- The sensor should not be subjected to any vibration because this could influence the measurement.
- In the case of sensor type MLAS, it must be assured that the mounting surface is flat.
- The object to be measured must be illuminated as well as possible in order to obtain accurate measurement results.
- Adequate heat dissipation must be assured for the device.
- Active cooling through the use of a cooling unit is required at sensor temperatures of greater than 70° C. Only wenglor cooling units may be used. These can be found at www.wenglor.com in the product area under "Supplementary Accessories".

5.1.1 The Sensor's Coordinate System

The coordinate system is a right-handed trihedron and is defined as follows:

- The Z-axis runs along the optical axis at the receiver side.
- The XY-plane coincides with the front face of the receiver.



5.1.2 Tightening Torque, Cable

Connection	Tightening Torque (Nm)
M12 connection cable (plug 1)	0.6
M12 network cable (socket 2)	0.4



ATTENTION!
Risk of property damage in case of improper installation!
The product may be damaged.
• Comply with installation instructions.



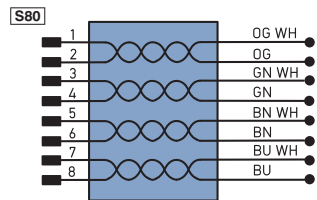
ATTENTION!
Insert the plug into the socket with slight pressure only!

5.2 Accessory Products

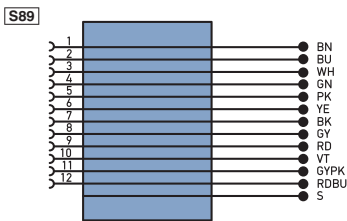
wenglor can provide you with suitable connection equipment for your product.

Suitable mounting technology no.	343
Suitable connection equipment no.	

50

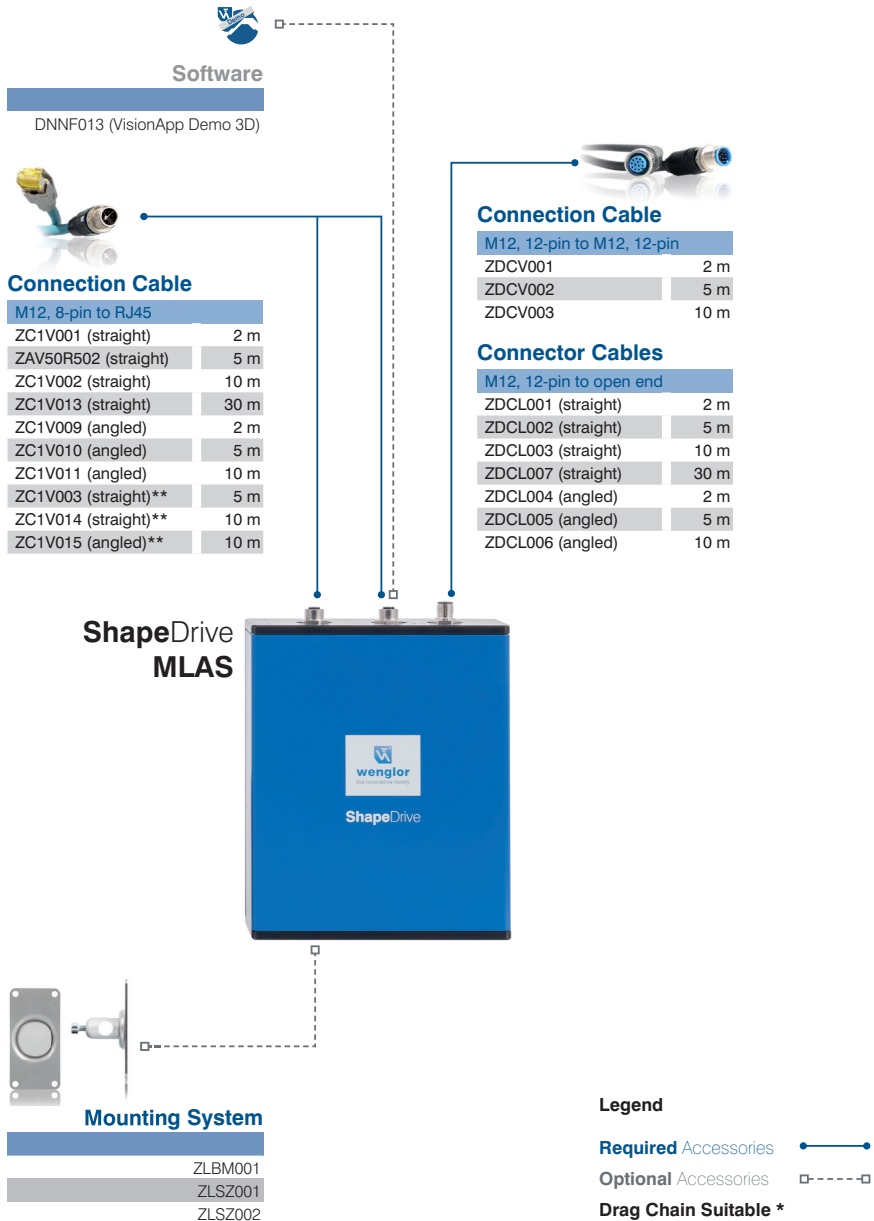


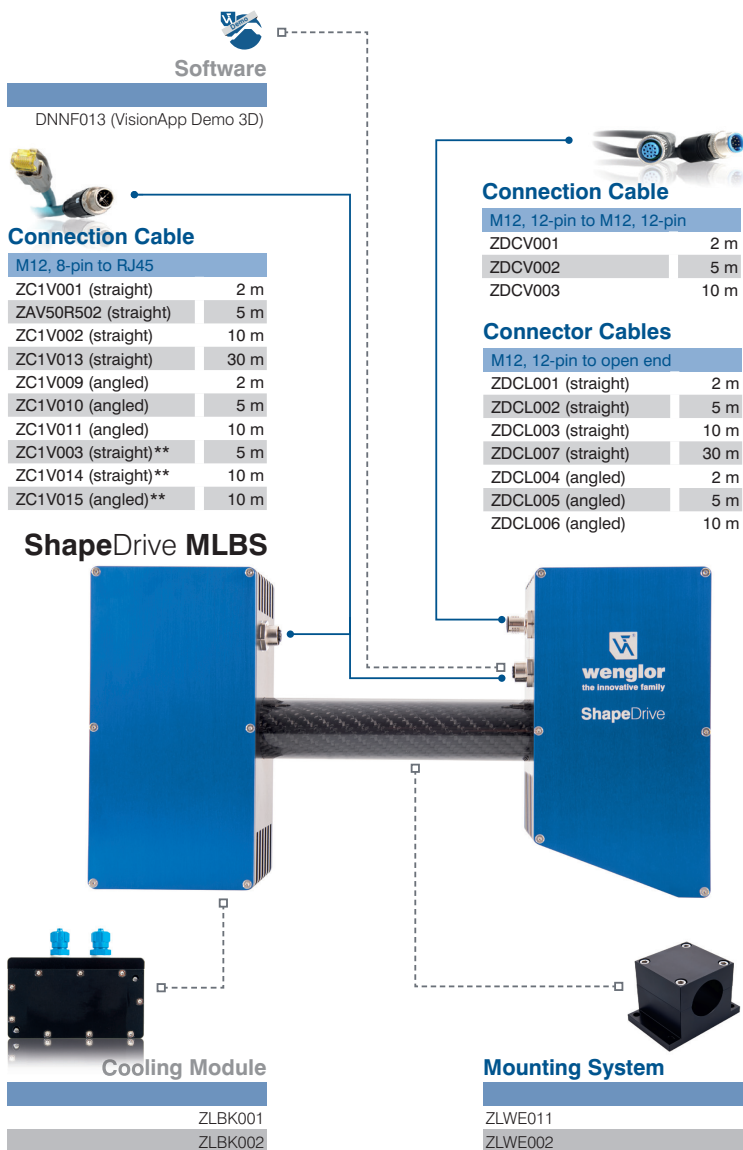
87



Cooling unit

5.3 System Overviews





5.4 Initial Start-Up

5.4.1 Electrical Connection

There are three connector plugs on the sensor. The sensor is supplied with 24 V operating power via the 12-pin plug. Both of the 8-pin sockets are used for communicating process and parameters data.



NOTE!

Maximum permissible length of the power supply cable is 30 m.

If the device is used outdoors, the power supply cable must be equipped with additional, suitable protection.

Please refer to the notes included in section 3.5 as well.

5.4.2 Initial Start-Up at the PC

Connect the product to supply power (power plug) and connect the Ethernet ports to the PC. It must be assured that the 10-Gb interface is connected to a 10 Gb Ethernet card (recommended: DeLOCK 89654 TN9710P 10GBase-T/NBase-T Ethernet Adapter).



CAUTION!

Make sure that the cables have been correctly and securely connected in order to assure error-free operation.



ATTENTION!

Risk of property damage in case of improper installation!

The product may be damaged.

- Comply with installation instructions.
-

5.4.3 Installing the Spinnaker SDK to the Computer



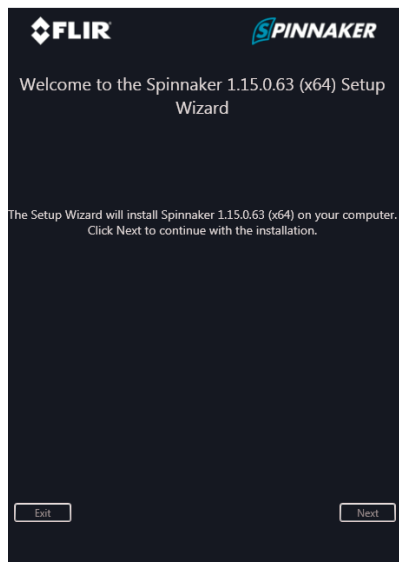
ATTENTION!

Please use only Spinnaker SDK version 1.15.0.63 (x64)!

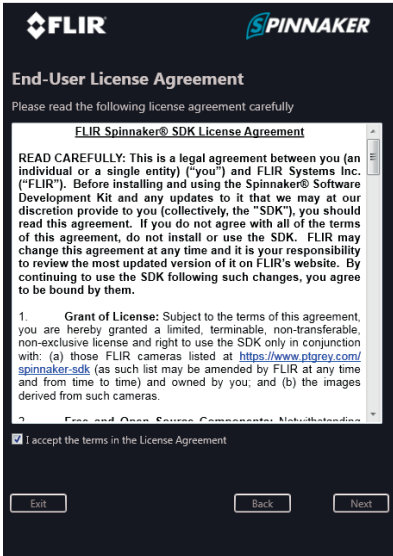
This version can be downloaded from the sensor's product page at www.wenglor.com (ShapeDrive_Essential_x.x.x.zip).

The Spinnaker SDK must first be installed to your computer. Complete the following steps:

1. Double-click Spinnaker SDK and then click "Next".



2. Accept the license agreement and click “Next”.



FLIR **SPINNAKER**

End-User License Agreement

Please read the following license agreement carefully

FLIR Spinnaker® SDK License Agreement

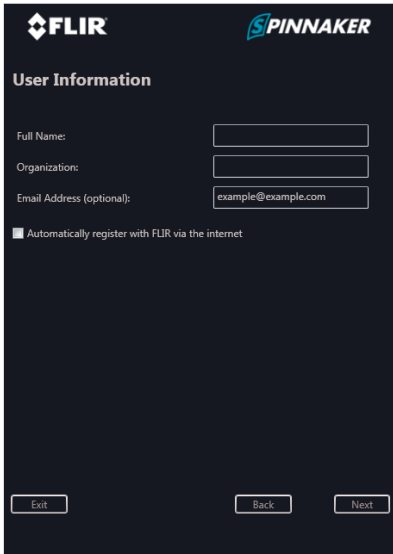
READ CAREFULLY: This is a legal agreement between you (an individual or a single entity) (“you”) and FLIR Systems Inc. (“FLIR”). Before installing and using the Spinnaker® Software Development Kit and any updates to it that we may at our discretion provide to you (collectively, the “SDK”), you should read this agreement. If you do not agree with all of the terms of this agreement, do not install or use the SDK. FLIR may change this agreement at any time and it is your responsibility to review the most updated version of it on FLIR’s website. By continuing to use the SDK following such changes, you agree to be bound by them.

1. **Grant of License:** Subject to the terms of this agreement, you are hereby granted a limited, terminable, non-transferable, non-exclusive license and right to use the SDK only in conjunction with: (a) those FLIR cameras listed at <https://www.flir.com/spinnaker-sdk> (as such list may be amended by FLIR at any time and from time to time) and owned by you; and (b) the images derived from such cameras.

☒ I accept the terms in the License Agreement

Exit Back Next

3. Enter your name, your company name and your e-mail address to the fields provided for this purpose in order to register the camera with FLIR. You can skip this step by removing the checkmark next to “Automatically register with FLIR via the internet”. Click “Next”.



FLIR **SPINNAKER**

User Information

Full Name:

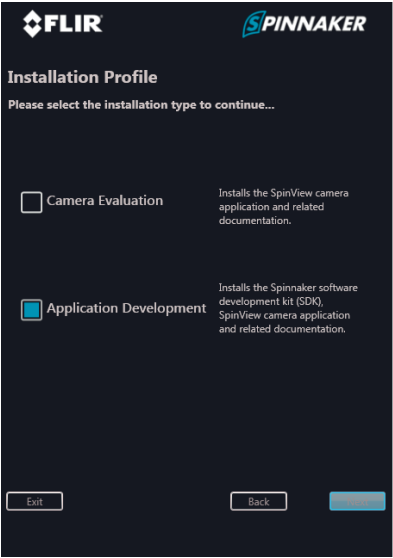
Organization:

Email Address (optional):

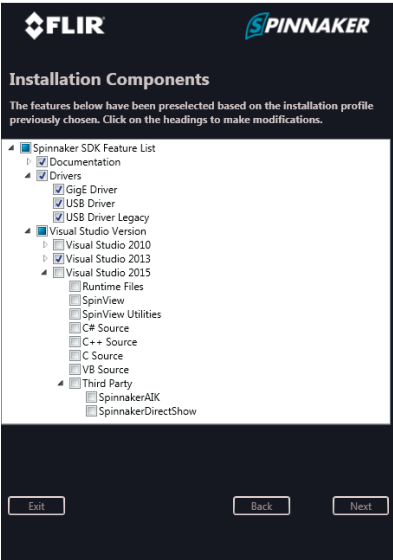
☒ Automatically register with FLIR via the internet

Exit Back Next

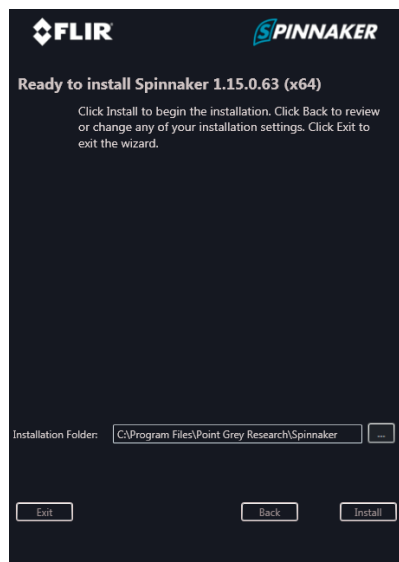
4. Select the “Application Development” option and click “Next”.



5. Open the submenu for the “Spinnaker SDK Feature List” and remove the checkmark next to “Visual Studio 2015” under “Visual Studio Version”. Select “Visual Studio 2013” and click “Next”.



6. Select the folder to which the Spinnaker SDK will be installed. The settings remain in storage. Click “Next”.



The Spinnaker SDK is installed to your PC.

5.4.4 Configuring the 10-Gigabit Network Connection

Right click your 10-gigabit network connection in the control panel and select “Properties”.



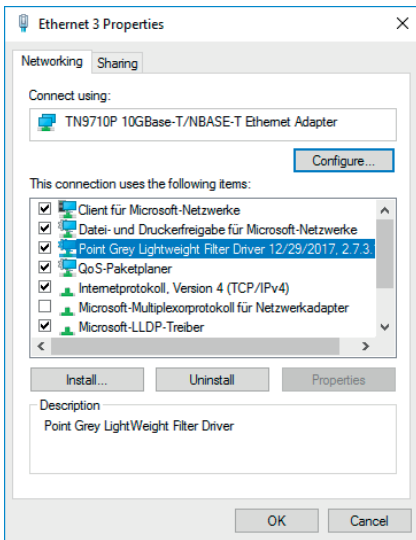
NOTE!

It's advisable to use the 10-gigabit network card specified in section 3.3.

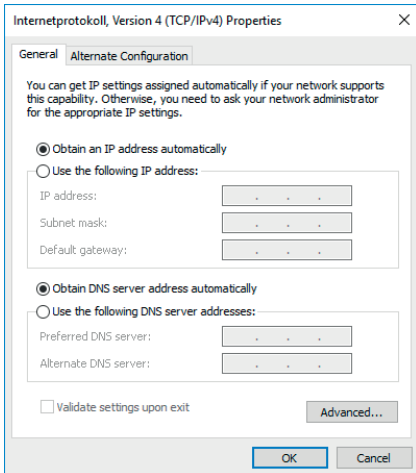
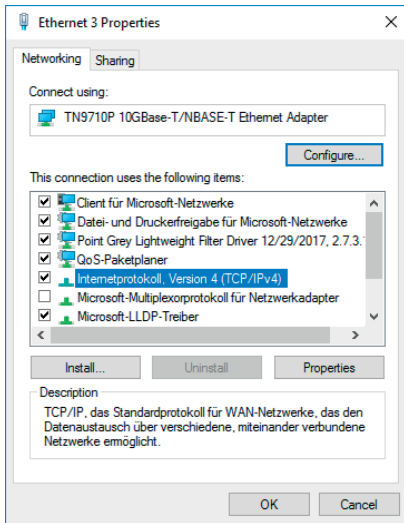
The configuration of the recommended network card is then displayed. Other network cards may differ from the options shown here, or it may not be possible to establish connection with the sensor.

Complete the following steps:

1. Make sure that the “Point Grey Lightweight Filter Driver” is activated.

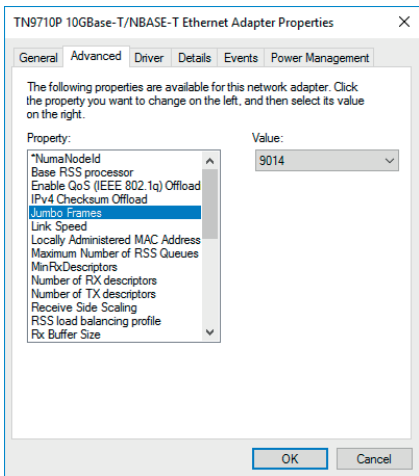


2. Select “Internet protocol (TCP/IPv4)” and double-click. Make sure that “Obtain an IP address automatically” is selected.



3. Click “Configure” and select “Advanced” from the tab. Enter the following settings under properties (if available):

Jumbo Frames	Select 9014 Bytes
Receive buffers	Select the highest possible value.
Receive Side Scaling	Select “Enabled”.
Number of receive (RX) descriptors	Select highest possible value
TCP/UDP Checksum Offload Option (IPv4)	Select “RX and TX enabled”.
Speed & Duplex	Select 10 “Gbps Full Duplex”.



Depending on the network card or driver, some of the properties might not be available. Change all of the properties which are available.

5.4.5 Configuring the 1-Gigabit Network Connection

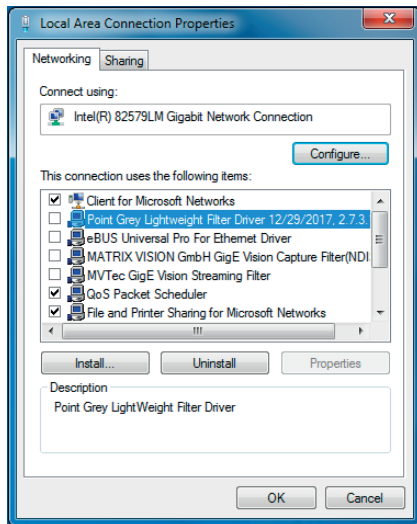


NOTE!

Settings for the 1-gigabit network connection differ from those of the 10-gigabit network connection. Please read the related sections carefully.

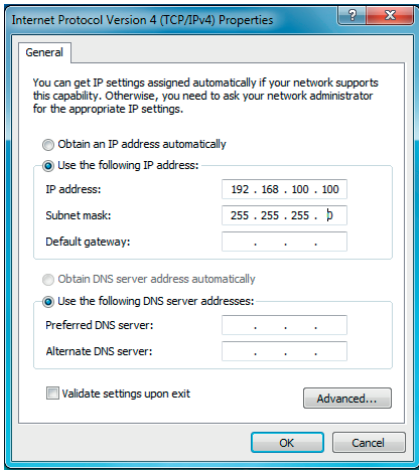
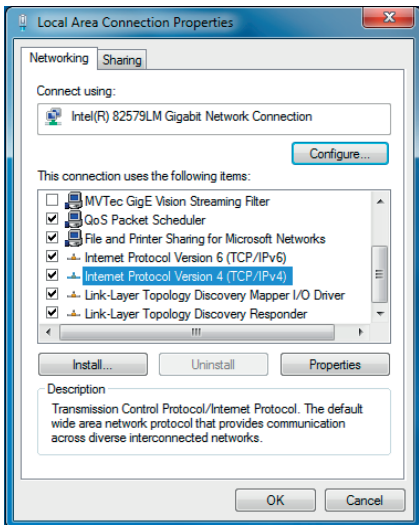
Right click your 1-gigabit network connection in the control panel and select "Properties".

1. Make sure that all GigE filter drivers are deactivated.



2. Select “Internet protocol (TCP/IPv4)” and double-click. Determine whether or not a static IP address has been assigned to your network card.

In order to be able to connect the sensor to your PC, you have to make sure that the sensor and your PC are both within the same IP address range (e.g. IP address: 192.168.100.100 and subnet mask 255.255.255.0).



3. Click “Configure” and select “Advanced” from the tab. Enter the following settings under properties (if available):

Jumbo Frames	Select the highest possible value.
Transmit descriptor (or transmit buffer)	Select the highest possible value.
Max. IRQ per second	1000
Interrupt moderation	On
Interrupt moderation rate	Extreme
Speed & Duplex	1 Gbps or Auto Negotiation

Depending on the network card or driver, some of the properties might not be available. Change all of the properties which are available.

5.4.6 Deactivating the Firewall and Antivirus Software

In some cases the Windows firewall or an antivirus program will block the UDP packets which are transferred between the ShapeDriveGigE interface and the GigE Vision client. It's therefore advisable to deactivate these programs.

5.5 Programming Interfaces

Data acquisition is controlled via the programming interface. The interface is described in the documentation for the SDK (see interface description in the product's separate download area).



NOTE!

The SDK makes it possible to configure the sensor's parameters. In this way, for example, filter settings can be entered for point cloud calculation.

5.6 GigE Vision

With a separate program, the ShapeDrive 3D sensor can be integrated into the GigE Vision application and thus used with a variety of different image processing programs (see interface description in the product's separate download area).

6. Integrated Web Server

The integrated website makes it possible to enter settings for the sensor and save them directly at the PC.



NOTE!

The website has been optimized for the following web browsers:

- Firefox 51 +
- Chrome 49
- IE11

Deviations may result in erroneous displays.

6.1 Accessing the Integrated Website

Start your web browser and enter the preset IP address (192.168.100.1) to the browser's address line.

6.1.1 General Device

General device

Device settings

1

Excellence in Shape

With Structured Light and Point Cloud to a Perfect 3D Model

Sensor state

Module status: ●

Temperature: 66 °C

Connected to: 192.168.100.11

4

General product information

Part number	MLAS202
Product version	1.0.0
Producer	wenglor sensoric GmbH
Description	3D Sensor
Serial number	000042
MAC address	54:4a:05:0a:0d:39

2

Version

Hardware version	3.5.2
Firmware version	1.0.0d H:20181208-01 S:20190124-39

3

Downloads

Manual Operating instructions

The integrated website's initial page is subdivided into the following areas:

① Category selection

The integrated website offers two different categories:

- **General device**

Overview page with general information regarding the sensor

- **Device settings**

Network settings can be changed and reset commands and sensor restarts can be triggered.


② General

This area contains general information regarding the product.

③ Downloads

After clicking this button, calibration data (linearization table) can be downloaded.

④ Sensor state

Module state	Displays the current module status (see section 3.7)
Temperature	Displays current temperature inside the sensor housing <div>  NOTE! Further information can be found in section 3.1, as well as in the general installation instructions in section 5.1. </div>
Connected to	Displays the sensors IP address to which the software is connected

6.1.2 Device Settings

The screenshot displays the Wenglor web interface. At the top left is the Wenglor logo with the tagline "the innovative family". A sidebar on the left contains two menu items: "General device" and "Device settings", with "Device settings" being the active selection. The main content area features a large banner with the text "Excellence in Shape" and "With Structured Light and Point Cloud to a Perfect 3D Model", accompanied by an image of a 3D point cloud model of a human head. To the right of the banner is a "Sensor state" box showing "Module status" with a green indicator, "Temperature" at 68 °C, and "Connected to" the IP address 192.168.100.11. Below the banner are three configuration sections: "Network settings" with fields for IP-address (192.168.100.1), Subnet mask (255.255.255.0), Standard gateway (192.168.100.254), and Webserver password, followed by an "Apply" button; "General settings" with buttons for "Reset sensor settings", "Restart", and "Network reset", each with its own "Apply" button; and "Downloads" with a link for "Data" labeled "Linearization table".

Content is subdivided into 3 categories:

Network settings

Network settings	
IP-address	<input type="text" value="192.168.100.1"/>
Subnet mask	<input type="text" value="255.255.255.0"/>
Standard gateway	<input type="text" value="192.168.100.254"/>
Webserver password	<input type="password"/>
<input type="button" value="Apply"/>	

The desired address ranges can be entered to the “**IP address**”, “**Subnet mask**” and “**Standard gateway**” fields. These addresses permit operation, as well as communication between the sensor and your network (PC).

**CAUTION!**

- If you don't have access to information concerning available address ranges within your network, contact your IT department first.
- Incorrect entries may result in network conflicts.
- The sensor's IP address must differ from the IP address of the PC.

After the desired changes have been made, enter the web server password (**admin**) to the field and click "Apply". The changes are activated without restarting the sensor. In order to return to the integrated website, enter the new IP address to your web browser's address line.

General settings

General settings	
Reset sensor settings	Apply
Restart	Apply
Network reset	Apply

Sensor and network settings can be restored to their default values and the sensor can be restarted by clicking "Apply".

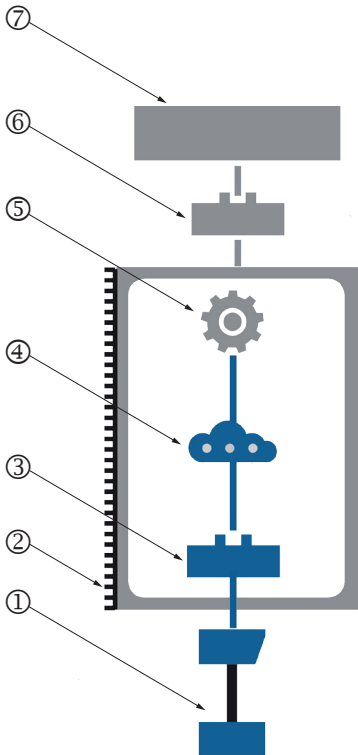
Downloads

Downloads	
Data	Linearization table

Appropriate calibration data for the sensor can be downloaded here.

7. System Overview

The 3D point cloud is not provided directly by the ShapeDrive 3D sensor – it's calculated externally by the user's PC. Either the ShapeDrive SDK can be integrated into the user's own application to this end, or the software package for the ShapeDrive GigE Vision interface can be used at the IPC. Both of these can be accessed at www.wenglor.com in the product's separate download area. The 3D point cloud is then available for further processing in the user software. The software described in the following chapter combines items 3, 4 and 5 and makes it possible to display the 3D point cloud.



- ① = ShapeDrive 3D sensor
- ② = User IPC
- ③ = ShapeDrive SDK or GigE Vision interface
- ④ = Point cloud
- ⑤ = User software
- ⑥ = User interface
- ⑦ = User application

8. VisionApp Demo 3D Software

VisionApp Demo 3D software is used for quick initial start-up of ShapeDrive 3D sensors and can be downloaded from www.wenglor.com. The product is listed under article number DNNF013.

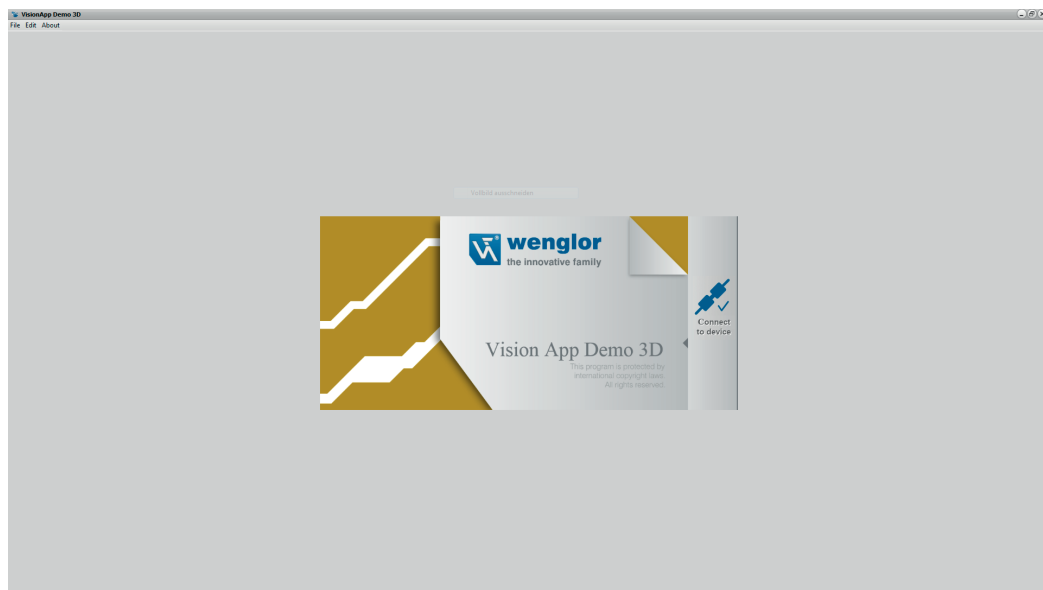


NOTE!

Before the ShapeDrive 3D sensor can be started up with VisionApp Demo 3D, it must first be assured that all required software has been installed and that all network settings have been entered in accordance with section 5.4. The latest version of VisionApp Demo 3D must always be used.

8.1 ShapeDrive 3D Sensor and VisionApp Demo 3D

After starting VisionApp Demo 3D, a sensor can be connected to the software via the “Connect to device” command.



8.2 Starting the Software and Selecting a Sensor

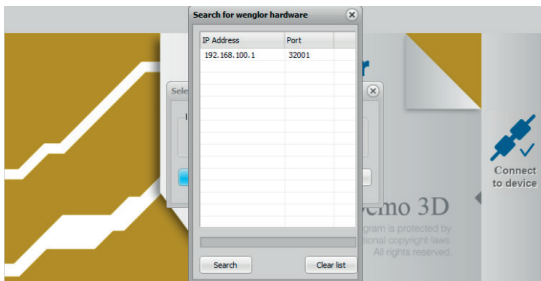
Select the icon shown in the middle for connection to a ShapeDrive 3D sensor.



You'll then be prompted to enter the sensor's IP address. When shipped from the factory, the IP address is 192.168.100.1 (see also section 6.1).

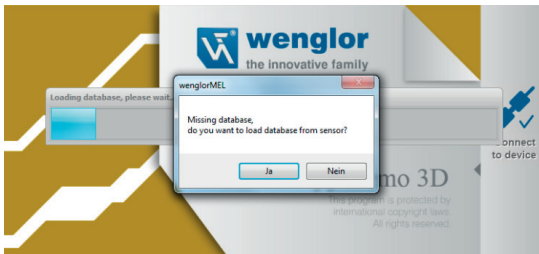
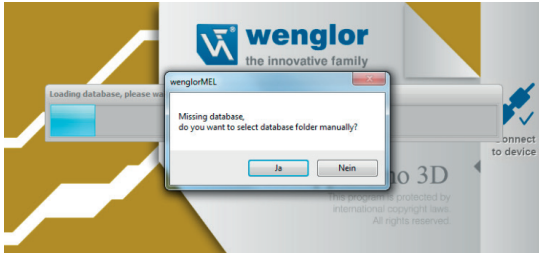


If the IP address is unknown, the sensor can be searched for within the network by clicking the “Search” button. If more than one device is available within the network, a corresponding number of IP addresses is displayed. If it's not possible to determine the sensor's IP address, make a list of all of the IP addresses and deactivate the ShapeDrive 3D sensor. Then click the “Search” button again. The IP address which is now missing is the sensor's address. Switch the sensor back on again and double-click the desired IP address in the search window. This address is then added to the higher-level dialog.



8.3 Downloading the Database with Calibration Data from the Sensor

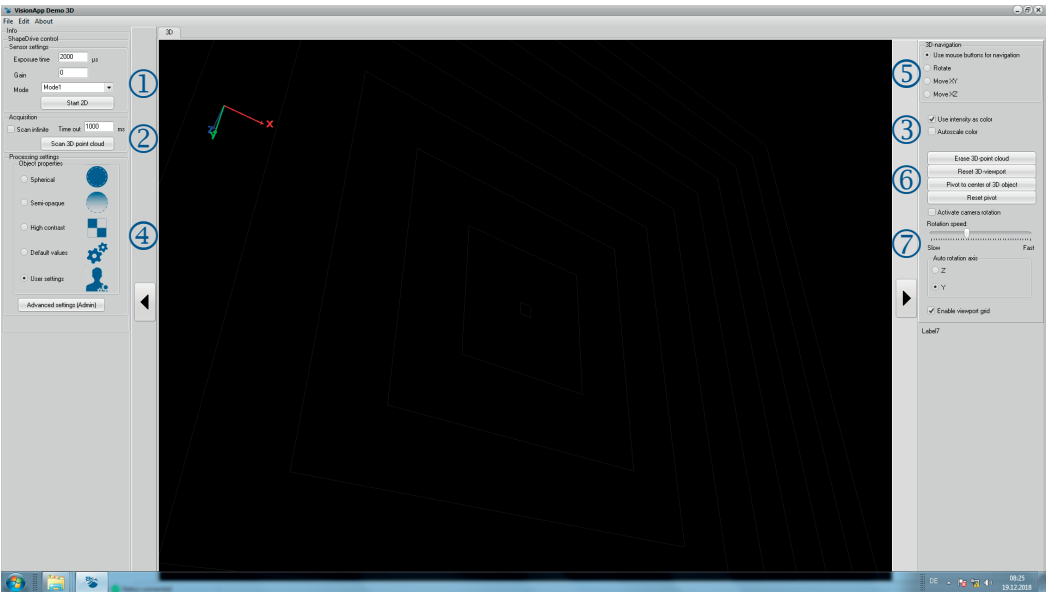
The first time the sensor is connected, the database with calibration data must be downloaded from the sensor, or the appropriate directory path has to be entered. VisionApp Demo 3D provides you with support in this regard.



It takes about 8 minutes to download the database. As an alternative, the calibration data can also be downloaded from the website (see section 6.1.1).

In the case of the SDK (see section 5.4.3) or the GigE Vision server (see section 5.6), the database is typically downloaded to the application directory the first time connection is established.

8.4 VisionApp Demo 3D User Interface

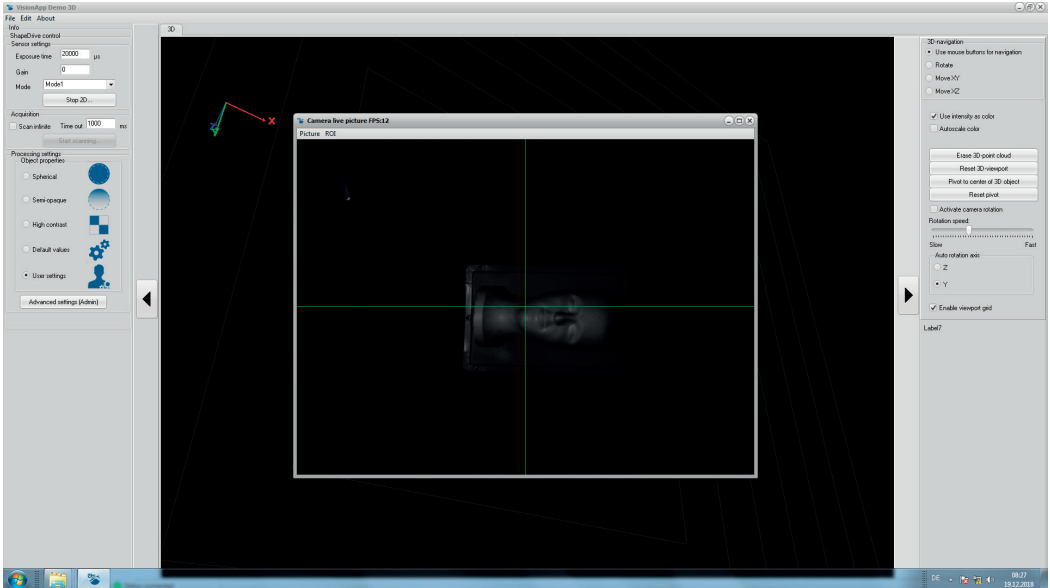


NOTE!
Only those functions required for visualizing the point cloud are explained below.

8.5 Aligning the Object to be Measured and Settings

① Sensor settings

Click the “Start 2D” button in order to ideally align the object. Position the object in the middle of the measuring field with the help of the preview. A crosshair can also be displayed as an additional tool by clicking “Picture”.



NOTE!

It's only possible to generate a 3D point cloud if the object lies within the sensors measuring volume range.

After the object has been properly aligned, exposure time has to be matched to the object. “Exposure Time” must be adjusted so that the object is readily recognizable but not overexposed.

If the object is still too dark even with maximum exposure time, “Gain” can be adjusted in order to increase boosting. Typical gain values lie within a range of 0 to 12.



NOTE!

Gain not only boosts the image recording, it also increases noise and should thus only be used if necessary.

The ShapeDrive 3D Sensor supports various modes which influence recording duration (see documentation for the SDK at www.wenglor.com in the product's separate download area).

8.6 3D Point Cloud

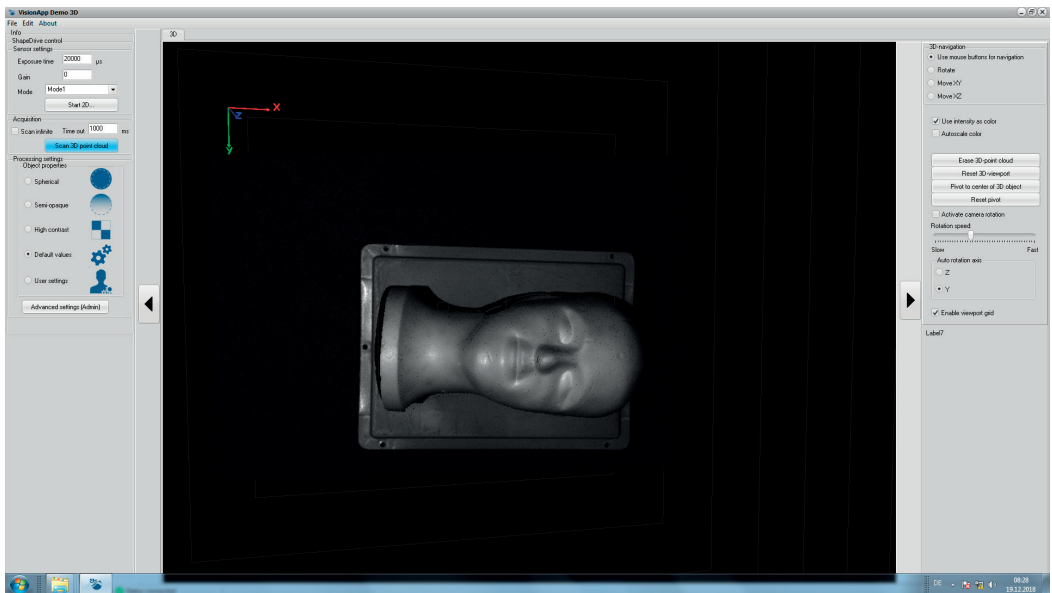
② Acquisition

Click the “Scan 3D point cloud” button in order to generate the object’s 3D point cloud. You can trigger either a single recording, or multiple recordings by activating “Scan infinite”. Recording frequency is defined in the “Timeout” field.

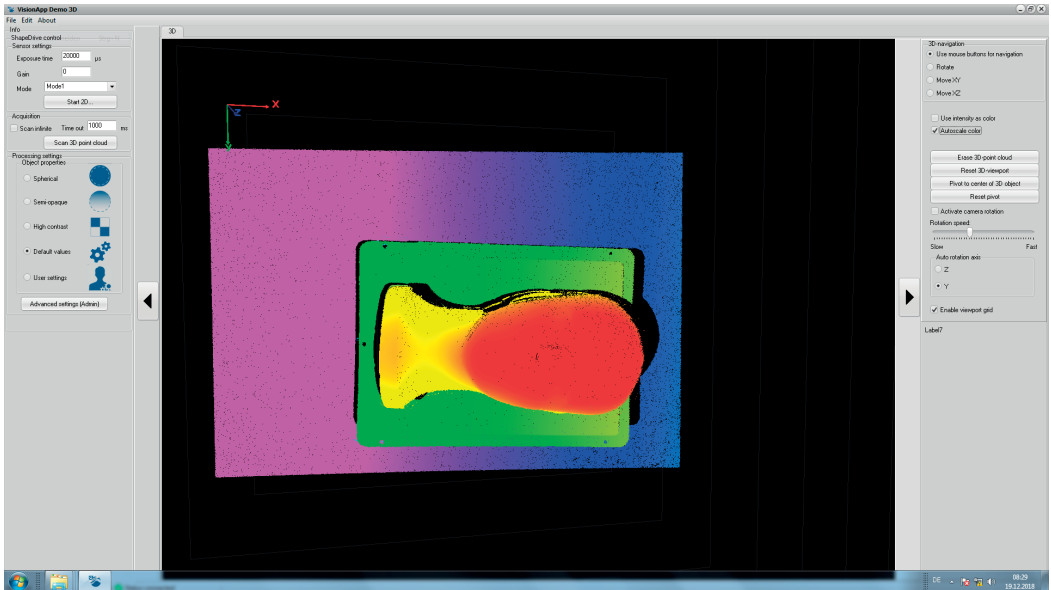
③ Display of object

The 3D visualization of the measured object can be displayed by means of gray tone mapping, or as a color display with height information:

- Tone Mapping (“Use intensity as color”)



- Automatic Color Display with Height Information (“Autoscale color”)



NOTE!

Check the following if no point cloud can be seen:



- Is the object to be measured within the measuring field?
- Is the object in the 2D view too bright or too dark? Adjust “Exposure time”/“Gain” in order to make the object darker or brighter.

8.7 Preset Filters

④ Object properties

Preset filters for optimizing the corresponding objects can be found at the middle of the left-hand edge of the user interface:

Spherical	Object with spherical surfaces
Semi opaque	Object made of semitransparent material (e.g. plastic)
High contrast	Object with highly contrasting areas (e.g. checkerboard pattern)
Default values	Sensor's default settings
User settings	Settings saved under "Advanced settings (Admin)"

If necessary, these filter settings can be changed under "Advanced Settings (Admin)".

A detailed description can be found in the documentation for the SDK in the product's separate download area at www.wenglor.com.

⑤ 3D navigation

Several functions are available at the top right-hand edge of the user interface which make it possible to rotate the object or shift it along the axes.

⑥ Display settings

Erase 3D point cloud	Deletes the 3D point cloud.
Reset 3D viewport	The 3D viewport is returned to its original position.
Pivot to center of 3D object	The pivot point of the 3D point cloud is centered within the viewport.
Reset pivot	The pivot point is reset.

⑦ Camera rotation

The "Activate camera rotation" function causes the camera to rotate (Z and Y can be selected as axes of rotation). Speed can be infinitely adjusted from "Slow" to "Fast".

8.8 Troubleshooting

8.8.1 No Connection to the Sensor

- Check the LED displays on the device (see section 3.7).
- Check all network settings (see section 5.4.2).
- Make sure that the website can be accessed (see section 6).
- Determine whether or not the sensor can be found using the search function (see section 8.2).
- Disconnect the sensor from all sources of power and restart.

If none of these measures help, please contact wenglor's support department.

8.8.2 No 3D point cloud

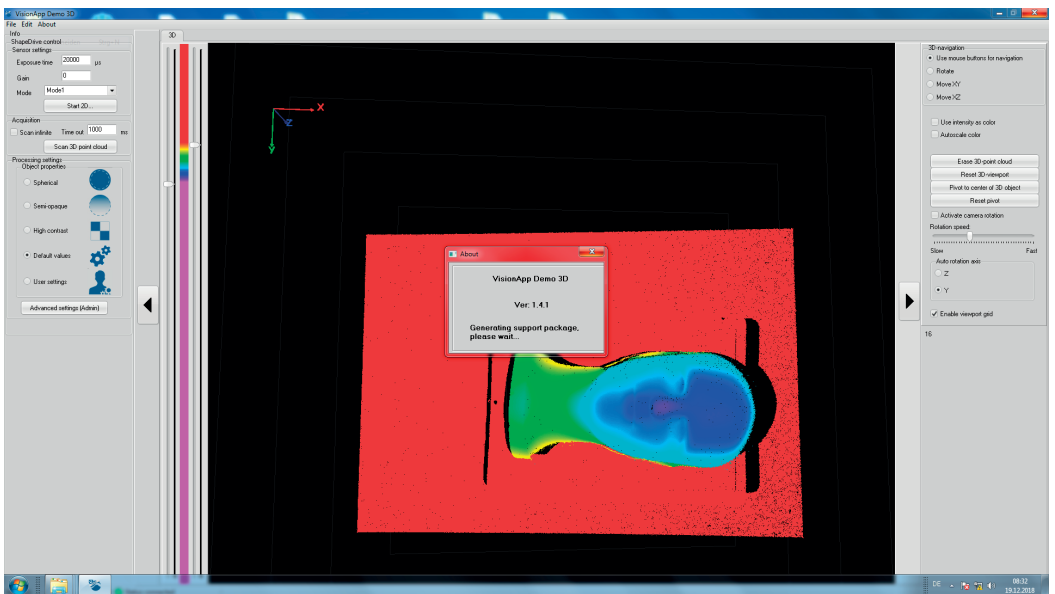
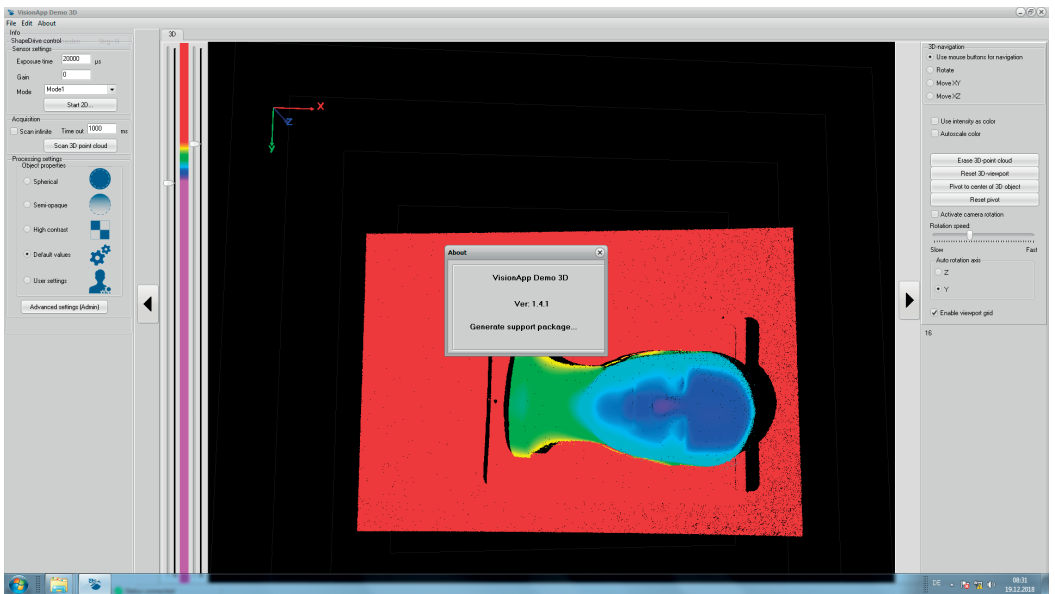
- Is recording started after triggering the point cloud? If so, make sure that the object is within the measuring field. If not, disconnect the sensor from all sources of power and restart.

8.8.3 Point cloud less than ideal

- Does the application involve a semitransparent object? → Select the corresponding filter (see preset filters in section 8.7).
- Does the application involve a spherical object? → Select the corresponding filter (see preset filters in section 8.7).
- Does the object have highly contrasting areas? → Select the corresponding filter (see preset filters in section 8.7).

8.8.4 Generating a Support Package

In the event that problems should occur, VisionApp Demo 3D provides the option of generating a support package via the "About" menu item. Upon request, this package should be made available to the support department in order to provide best possible assistance.



9. Maintenance Instructions



NOTE!

- This wenglor sensor is maintenance-free.
- Cleaning of the optical surfaces on demand. Cleaning with clean/ oil free compressed air from a compressed air can respectively isopropanol ($\geq 99,9\%$) and optical tissue.
- Do not clean the sensor with solvents or cleansers which could damage the product.

10. Environmentally Sound Disposal

wenglor sensoric GmbH does not accept the return of unusable or irreparable products. Respectively valid national waste disposal regulations apply to product disposal.

11.

12. Change Index, Operating Instructions

Version	Date	Description/Change
1.0.0	2/28/2019	Initial version of the operating instructions
1.1.0	30/7/2019	<ul style="list-style-type: none"> • MLAS103/203: Working range Z • Resolution X/Y
1.2.0	29/01/2020	<ul style="list-style-type: none"> • Service life • Recording duration • Extension of sensor's coordinate system
1.3.0	22/06/2020	<ul style="list-style-type: none"> • Extension of system requirements • Adaption network connections
1.3.1	28/09/2020	<ul style="list-style-type: none"> • Adaption of connection diagramm voltage supply

13. EU Declaration of Conformity

The EU declaration of conformity can be found on our website at www.wenglor.com in the product's separate download area.